BCA

APRIL/MAY 2023

CCA33 — OPERATION RESEARCH

Time : Three hours Maximum : 75 marks

SECTION A — (10 × 2 = 20 marks)

Answer ALL the questions.

1. What is the use of constraints?

2. Give the two methods used to get solution using graphical method.

3. Define degeneracy.

4. Specify the necessary and sufficient condition for a transportation problem to have a solution.

5. Give the uses of number of machines utilized in sequencing problem.

6. What is meant by processing order?

7. Define planning.

8. Give the function of CPM.

9. What is the use of node and arcs?

10. Define path and give example.

SECTION B — (5 × 5 = 25 marks)

Answer ALL the questions.

11. (a) Rewrite in standard form the following linear programming problem Min $Z = 12x_1 + 5x_2$ STC $5x_1 + 3x_2 >= 15$ $7x_1 + 2x_2 <= 14 x_1,\ x_2 >= 0$.

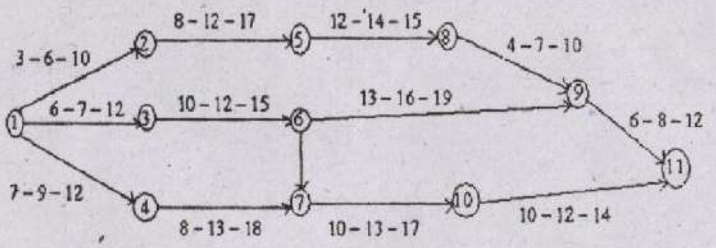
Or

(b) Write down the procedure for formulation.

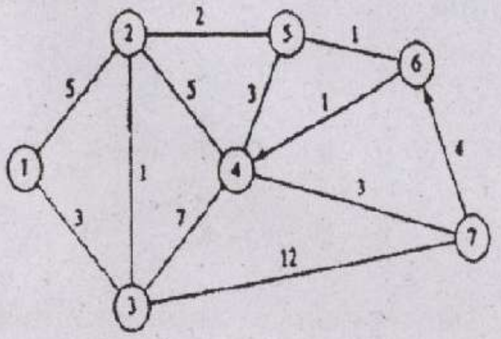
12. (a) Write mathematical form of transportation problem.

Or

19. Calculate the variance and the expected time for each activity.



20. The Tell-All mobile-phone company services six geographical areas. The satellite distances (in miles) among the six areas are given in Figure. Tell-All needs to determine the most efficient message routes that should be established between each two areas in the network.



(b) Find an initial basic feasible solution of the following problem using north west corner rule.

	D_1	D_2	D_3	D_4	Supply
O_1	5	3	6	2	19
O_2	4	7	9	1	37
O_3	3	4	7	5	34
Demand	16	18	31	25	

13. (a) Write short note on processing n jobs on three machines.

Or

(b) Find the sequence of job 1 and 2 on four machines for the given technological order.

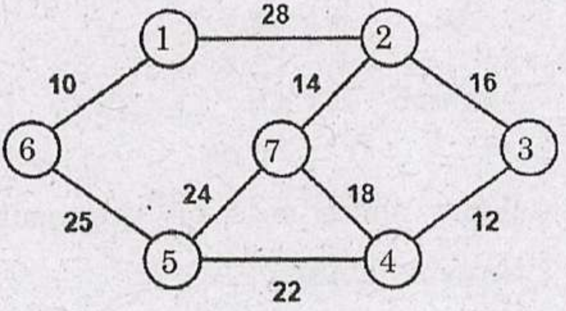
Job 1.	Order of machining:	A	B	C	D
	Time in hours.	2	3	3	4
Job 2.	Order of machining	A	B	C	D
	Time in hours.	2	3	3	4

14. (a) Write short note on Fulkerson's rule.

Or

(b) What are the time values associated with PERT? Explain.

15. (a) Construct the minimum spanning tree (MST) for the given graph using Kruskal's Algorithm.



Or

(b) Narrate the network definition with example.

SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Find the max Value of the given LPP Max $Z = 7x_1 + 3x_2$ STC $x_1 + 2x_2 \;<=\; 3x_1 + x_2 <= 4$, $0 <= x_1 <= 5/2$, $0 <= x_2 <= 3/2$, x_1, $x_2 >= 0$.

17. Consider the following transportation problem

	D_1	D_2	D_3	D_4	Availability
O_1	5	8	3	6	30
O_2	4	5	7	4	50
O_3	6	2	4	6	20
Requirement	30	40	20	10	

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Determine initial basic feasible solution by VAM.

18. There are nine jobs, each of which must go through two machines P and Q in the order PQ, the processing times (in hours) are given below:

Machine	Job (s)								
	A	B	C	D	E	F	G	H	I
P	2	5	4	9	6	8	7	5	4
Q	6	8	7	4	3	9	3	8	11

Find the sequence that minimizes the total elapsed time T. Also calculate the total idle time for the machines in this period.